REMARKS

This is intended as a full and complete response to the Office Action dated September 2, 2009 having a shortened statutory period for response set to expire on December 2, 2009. Claims 1, 2, 23, 29, 35, 36, 45, 46, 47, 49 and 51 have been amended have been added to more clearly recite various aspects of the invention. Support for the amendments may be found throughout the specification, including page 6, lines 15-20, page 11, lines 6-10, page 26, lines 15-19 and page 57, lines 19-24. Claims 48, 50 and 51 have been cancelled without prejudice. Claims 47 and 49 have been rewritten in independent form. Applicants believe no new matter has been introduced by the amendments presented herein. The amendments have been made in a good faith effort to advance prosecution on the merits. Please reconsider the claims pending in the application for reasons discussed below.

A brief interview over the telephone was held on November 25, 2009 with the Examiner to clarify that the rejection under 35 U.S.C 102(e) in view of U.S. Patent No. 6,691,038 ("Zajac") was incorrect and that the proper rejection should have been under 35 U.S.C 102(a). Applicant would like to thank the Examiner for conducting this interview.

Claims 2-7 and 18-22 stand rejected under 35 U.S.C. 112 for lacking the enablement requirement. Specifically, the Examiner takes the position that the transform function is not defined in the specification. Claim 2 has been amended to now include "wherein the navigation data, the operating states, the environmental data and the survey design data are input to a transform function to perform the estimating, determining, and calculating steps." Support for the amendment may be found throughout the specification, including page 26, lines 15-19, page 27, lines 15-19 and page 37, lines 1-9. It is respectfully submitted therefore that the inputs and outputs of the transform function are clearly defined in claim 2. Further, the transform function is defined throughout the specification including page 8, lines 1-4, page 26, lines 15-19, page 27, lines 15-19, page 37, lines 1-9, page 41, lines 7-17, page 43, lines 9-11 and page 49, lines 8-11 such that the enablement requirement is met in the specification. Withdrawal of the rejection is respectfully requested.

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Claims 1-3, 6, 9-15, 18, 19, 22, 25, 27-30 and 41 stand rejected under 35 U.S.C 102(e) as being anticipated by U.S. Patent No. 6,691,038 ("Zajac"). In a telephone conference with the Examiner on November 23, 2009, the Examiner indicated that these claims should have been rejected under 35 U.S.C. 102(a) as opposed to 35 U.S.C. 102(e). Accordingly, Applicants treat this rejection as a rejection under 35 U.S.C 102(a).

Zajac is generally directed to an active control system for a towed seismic streamer array that enables relative positional control of towed seismic streamers. (See Zajac, Abstract). The Examiner takes the position that column 5, lines 19-20 of Zajac teaches "operating states from sensors associated with the spread control elements." (See office action, page 3, paragraph 5). The relevant section of Zajac is provided below for the Examiner's convenience.

> In another aspect of the invention the apparatus further comprises a master controller which compensates for maneuverability in the positioning commands to compensate for maneuverability influences on the positioning of the streamers and the array geometry. In another aspect of the invention the apparatus further comprises a **monitor for determining the status of each streamer**, wherein the master controller adjusts the array geometry to compensate for a failed streamer. (Zajac, column 5, lines 15-23, Emphasis Added).

As shown above, Zajac does not teach operating states from sensors associated with the **spread control elements**, as recited in claim 1. In contrast, Zajac only teaches determining the status of each **streamer,** which is not the same as the **spread control elements**. A "spread control element" and "spread control element operating states" are defined in the specification as follows:

> "Spread control element" means a spread component that is controllable and is capable of causing a spread component to change coordinates, either cross-line or inline.

> "Spread control element operating states" means measurements giving information relevant to a spread model (such as a hydrodynamic force model). Examples include winged body orientation, water flow rates over deflectors, wing angles relative to a wing housing body, rudder angle, propeller speed, propeller pitch, tow cable tensions, etc. (Specification, page 6, line 15-20).

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As shown above, spread control elements are not the same as a streamer. In this manner, Zajac fails to teach "operating states from sensors associated with the spread control elements," as recited in claim 1. .

The Examiner also takes the position that column 2, lines 62-64 of Zajac teaches survey design data. (See office action, page 3, paragraph 5). The relevant section of Zajac is provided below for the Examiner's convenience.

> The three component (x, y, z) position of each streamer element, relative to the vessel, relative to each other and relative Earth coordinate latitude and longitude is controlled, tracked and stored with respect to time during each seismic data acquisition run. This stored data is referred to as legacy data. Environmental factors (wind speed, currents, temperature, salinity, etc), and maneuverability data for the streamers and **geometry of the towed array (cable diameter, array type, deployed configuration, vessel type, device type, etc.) for the seismic data acquisition run** are also sensed with respect to time and stored as legacy data.
> (Zajac, column 2, lines 55-66, Emphasis Added).

As shown above, Zajac does not teach collecting input data having survey design data. Zajac merely proposes **sensing the geometry of the towed array** and mentions nothing about collecting **survey design data**.

Claim 12 provides further clarification to the survey design data. As to this claim, the Examiner explains that the above referenced section in Zajac teaches the limitations recited in claim 12. (See office action, pages 4-5, paragraph 12). As shown above, Zajac describes the geometry of the towed array as including cable diameter, array type, deployed configuration, vessel type and device type. In this manner, Zajac merely describes tangible characteristics of the towed array. Claim 12, however, describes the survey design data as including spread tracks, performance specifications or survey objectives, which are intangible characteristics or tactics (or plan) for a survey. Further, spread tracks, performance specifications or survey objectives are not mentioned anywhere in Zajac's disclosure.

The Examiner also takes the position that Zajac teaches estimating positions of the sources and receivers using the navigation data, the operating states, and the environmental data. (See office action, page 3). The relevant portion of Zajac is provided below for the Examiner's convenience.

In another aspect of the invention the apparatus further comprises a master controller which compares the **positions of the streamers** versus time and the array geometry versus time to a **desired streamer position** and array geometry versus time and issues positioning commands to the ASPDs to maintain the **desired streamer position** and array geometry versus time. In another aspect of the invention the apparatus further comprises a master controller that factors in environmental factors into the positioning commands to compensate for environmental influences on the **positioning of the streamers** and the array geometry.
(Zajac, column 5, lines 4-14, Emphasis Added).

Optimal path data may be provided as a desired seismic acquisition path during primary seismic data acquisition or during in fill shooting. Optimal path data steering is preferably divided between an optimal path for the **tow vessel** 10 and an optimal path for the towed array.
(Zajac, column 8, lines 11-15, Emphasis Added).

As shown above, Zajac does not teach estimating the **positions of sources and receivers**, as recited in claim 1. In contrast, Zajac merely proposes estimating the position of a streamer. A streamer is generally several thousand meters long and contains a large number of receivers and associated electronic equipment distributed along its length. (See specification, page 1, lines 11-14). In this manner, sources and receivers make up only part of the streamer, but they do not make up the entire streamer. Estimating positions of individual sources and receivers is not the same as estimating a position of a streamer.

Further, as mentioned above, Zajac does not teach operating states from sensors associated with the spread control elements. Since Zajac does not teach the operating states, Zajac cannot teach estimating positions of the sources and receivers using the navigation data, **the operating states**, and the environmental data, as recited in claim 1.

With regard to claim 2, claim 2 has been amended to now include "wherein the navigation data, the operating states, the environmental data and the survey design data are input to a transform function to perform the estimating, determining, and calculating steps." In this manner, the transform function uses the navigation data, the operating states, the environmental data and the survey data as inputs to the function. As mentioned above, Zajac does not teach survey design data. Zajac also does not

mention a transfer function anywhere in its disclosure. As such, Zajac does not teach a transfer function or using the survey design data as an input to the transfer function.

With regard to claim 25, Zajac fails to teach providing a set of desired coordinate positions of at least two of the spread control elements. The Examiner points to column 5, line 7 and column 8, lines 11-15, as teaching this limitation. (See office action, page 6, paragraph 18). This section of Zajac was reproduced above. Zajac merely describes the **current** positions of streamers and tow vessels, which are different from **desired** positions of spread control elements. Further, streamers and tow vessels are not the same as spread control elements. As mentioned above, a spread control element is a spread component that is controllable and is capable of causing a spread component to change coordinates, either cross-line or inline.

For these reasons, claims 1 and 25 are patentable over Zajac. Claims 2-22, 26-31, 39-44 and 53 are also patentable over Zajac, since they depend from claims 1 and 25, respectively. Withdrawal of the rejection is respectfully requested.

Claims 4, 5, 7, 16 and 53 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Zajac in view of US Patent No. 6,618,321 ("Brunet"). Neither Zajac nor Brunet, alone or in combination, teaches or discloses operating states from sensors associated with the spread control elements, estimating the positions of sources and receivers, or survey design data, as recited in claim 1. Since claims 4, 5, 7, 16 and 53 depend from claim 1 and since neither Zajac nor Brunet, alone or in combination, teaches, discloses or suggests all the limitations of claim 1, claims 4, 5, 7, 16 and 53 are therefore also patentable over Zajac and Brunet. Withdrawal of the rejection is respectfully requested.

Claim 8 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Zajac in view of US Patent No. 5,448,233 ("Saban"). Neither Zajac nor Saban, alone or in combination, teaches or discloses operating states from sensors associated with the spread control elements, estimating the positions of sources and receivers, or survey design data, as recited in claim 1. Since claim 8 depends from claim 1 and since neither Zajac nor Saban, alone or in combination, teaches, discloses or suggests all the limitations of claim 1, claim 8 is therefore also patentable over Zajac and Saban. Withdrawal of the rejection is respectfully requested.

Claims 17 and 23 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Zajac in view of US Patent No. 7,446,706 ("Riley"). Like claim 1, claim 23 recites operating states from sensors associated with the spread control elements, estimating the positions of sources and receivers, and survey design data. Neither Zajac nor Riley, alone or in combination, teaches or discloses operating states from sensors associated with the spread control elements, estimating the positions of sources and receivers, or the survey design data, as recited in claims 1 and 23. Since claim 17 depends from claim 1 and since neither Zajac nor Riley, alone or in combination, teaches, discloses or suggests all the limitations of claims 1 and 23, claims 17 and 23 are therefore patentable over Zajac and Riley. Withdrawal of the rejection is respectfully requested.

Claim 20 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Zajac in view of Gikas et al, "Reliability analysis in dynamic systems: Implications for positioning marine seismic networks", *Geophysics*, Vol. 64, No. 4, July-August 1999, pgs. 1014-1022 ("Gikas"). Neither Zajac nor Gikas, alone or in combination, teaches or discloses operating states from sensors associated with the spread control elements, estimating the positions of sources and receivers, or survey design data, as recited in claim 1. Since claim 20 depends from claim 1 and since neither Zajac nor Gikas, alone or in combination, teaches, discloses or suggests all the limitations of claim 1, claim 20 is therefore also patentable over Zajac and Gikas. Withdrawal of the rejection is respectfully requested.

Claim 21 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Zajac in view of Armstrong et al, "The best parameter subset using the Chebychev curve fitting criterion", *Mathematical Programming*, Vol. 27, No. 1, September 1983, pgs. 64-74 ("Armstrong"). Neither Zajac nor Armstrong, alone or in combination, teaches or discloses operating states from sensors associated with the spread control elements, estimating the positions of sources and receivers, or survey design data, as recited in claim 1. Since claim 21 depends from claim 1 and since neither Zajac nor Armstrong, alone or in combination, teaches, discloses or suggests all the limitations of claim 1, claim 21 is therefore also patentable over Zajac and Armstrong. Withdrawal of the rejection is respectfully requested.

Claim 26 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Zajac in view of US Patent No. 6,292,436 ("Rau"). Neither Zajac nor Rau, alone or in combination, teaches or discloses providing a set of desired coordinate positions of at least two of the spread control elements, as recited in claim 25. Since claim 26 depends from claim 25 and since neither Zajac nor Rau, alone or in combination, teaches, discloses or suggests all the limitations of claim 25, claim 26 is therefore also patentable over Zajac and Rau. Withdrawal of the rejection is respectfully requested.

Claim 31 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Zajac in view of US Patent No. 6,681,710 ("Semb"). Neither Zajac nor Semb, alone or in combination, teaches or discloses providing a set of desired coordinate positions of at least two of the spread control elements, as recited in claim 25. Since claim 31 depends from claim 25 and since neither Zajac nor Semb, alone or in combination, teaches, discloses or suggests all the limitations of claim 25, claim 31 is therefore also patentable over Zajac and Semb. Withdrawal of the rejection is respectfully requested.

Claims 32-37 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Zajac in view of US Patent No. 6,088,298 ("Onat"). As mentioned above with regard to claim 1, Zajac does not teach or disclose estimating the positions of sources, as recited in claim 32. Like Zajac, Onat also does not teach this limitation. Further, neither Zajac nor Onat teaches "wherein the controller estimates the positions of the sources," as recited in claim 37. Accordingly, claims 32 and 37 are patentable over Zajac and Onat. Claims 33-36 are also patentable over Zajac and Onat since they depend from claim 32. Withdrawal of the rejection is respectfully requested.

Claims 39, 40, 42 and 45-51 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Zajac in view of US Patent No. 4,063,213 ("Itria"). Neither Zajac nor Itria, alone or in combination, teaches or discloses providing a set of desired coordinate positions of at least two of the spread control elements, as recited in claim 25. Since claims 39, 40 and 42 depend from claim 25 and since neither Zajac nor Itria, alone or in combination, teaches, discloses or suggests all the limitations of claim 25, claims 39, 40 and 42 are therefore also patentable over Zajac and Itria.

Claim 45 has been amended to now include "controlling the seismic survey spread by **coordinating** the positioning of the vessel control elements, the source

control elements and the streamer control elements." Claim 47 has been rewritten in independent form to now recite "controlling the seismic survey spread by **coordinating** the positioning of the vessel control elements and the source control elements." Claim 49 has been rewritten in independent form to now recite "controlling the seismic survey spread by **coordinating** the positioning of the streamer control elements and the source control elements." Claim 51 has been amended to now include "controlling the seismic survey spread by **coordinating** the positioning of the first and second vessel control elements." Neither Zajac nor Itria, alone or in combination, teaches or discloses these newly added limitations. Claims 45, 47, 49 and 51 are therefore patentable over Zajac and Itria. Claims 46 is also patentable over Zajac and Itria since it depends from claim 45. Claims 48 and 50 have been cancelled without prejudice, thereby rendering the rejection moot with respect to those claims. Withdrawal of the rejection is respectfully requested.

Claims 43, 44 and 52 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Zajac in view of US Patent No. 6,590,831 ("Bennet"). Neither Zajac nor Bennet, alone or in combination, teaches or discloses providing a set of desired coordinate positions of at least two of the spread control elements, as recited in claim 25. Since claims 43 and 44 depend from claim 25 and since neither Zajac nor Bennet, alone or in combination, teaches, discloses or suggests all the limitations of claim 25, claims 43 and 44 are therefore also patentable over Zajac and Bennet. Claim 52 has been cancelled without prejudice, thereby rendering the rejection moot with respect to that claim. Withdrawal of the rejection is respectfully requested.

In conclusion, the references cited by the Examiner, neither alone nor in combination, teach, show, or suggest the claimed invention. Having addressed all issues set out in the office action, Applicants respectfully submit that the claims are in condition for allowance and respectfully request that the claims be allowed.

The prior art made of record is noted. However, it is believed that the secondary references are no more pertinent to the Applicants' disclosure than the primary references cited in the office action. Therefore, it is believed that a detailed discussion of the secondary references is not deemed necessary for a full and complete response to this office action.

Respectfully submitted,

/Ari Pramudji/ December 1, 2009
Ari Pramudji
Registration No. 45,022
PRAMUDJI WENDT & TRAN, LLP
1800 Bering, Suite 540
Houston, Texas 77057
Telephone: (713) 468-4600
Facsimile: (713) 980-9882
Attorney for Assignee